FACT SHEET FOR NPDES PERMIT WA 0040827

PUGET SOUND ENERGY, JACKSON PRARIE GAS STORAGE PROJECT

July 2010

PURPOSE of this Fact Sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Puget Sound Energy (PSE), Jackson Prairie Gas Storage Project (JPGSP).

The Environmental Protection Agency (EPA) developed the NPDES permitting program as a tool to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." EPA delegated to Ecology the power and duty to write, issue, and enforce NPDES permits within Washington State. Both state and federal laws require any industrial facility to obtain a permit before discharging waste or chemicals to a water body.

An NPDES permit limits the types and amounts of pollutants the facility may discharge. Those limits are based either on (1) the pollution control or wastewater treatment technology available to the industry, or on (2) the receiving water's customary beneficial uses. This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit *and accompanying fact sheet* for public evaluation before issuing an NPDES permit.

PUBLIC ROLE in the Permit

Ecology makes the draft permit and fact sheet available for public review and comment at least 30 days before issuing the final permit to the facility operator (WAC 173-220-050). Copies of the fact sheet and draft permit for Puget Sound Energy Jackson Prairie Gas Storage Project NPDES permit WA 0040827**,** are available for public review and comment from August 25, 2010, until the close of business September 27, 2010. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement**.

Before publishing the draft NPDES permit, PSE, JPGSP, reviewed it for factual accuracy. Ecology corrected any errors or omissions about the facility's location, product type or production rate, discharges or receiving water, or its history.

After the public comment period closes, Ecology will summarize substantive comments and our responses to them. Ecology will include our summary and responses to comments to this Fact Sheet as **Appendix D - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology will not revise the rest of the fact sheet, but the full document will become part of the legal history contained in the facility's permit file.

Aziz Mahar prepared the permit and this fact sheet.

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I. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

Ecology adopted rules describing how it exercises its authority:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC) and for ground waters (chapter 173-200 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of Plans and Reports for Construction of Wastewater Facilities (chapter 173-240 WAC)

These rules require any industrial facility operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See **Appendix A--Public Involvement** for more detail about the Public Notice and Comment procedures). After the Public Comment Period ends, Ecology may make changes to the draft NPDES permit in response to comments. Ecology will summarize the responses to comments and any changes to the permit in **Appendix D.**

II. BACKGROUND INFORMATION

Table 1 - General Facility Information

Applicant:	Puget Sound Energy
Facility Name and Address:	Jackson Prairie Gas Storage Project 239 Zandecki Road, Chehalis, WA 98532
Type of Treatment:	Natural Gas Storage
SIC Code	4924
Discharge Location:	**Surface Waterbody Name**: Cowlitz River **Site #1** Latitude: 46.4575 N Longitude: 122.8083 W **Site #2** Latitude: 46.46444 N Longitude 122.7672 W **Underground Injection Well** Latitude: 46.53278 N Longitude: 122.835 W

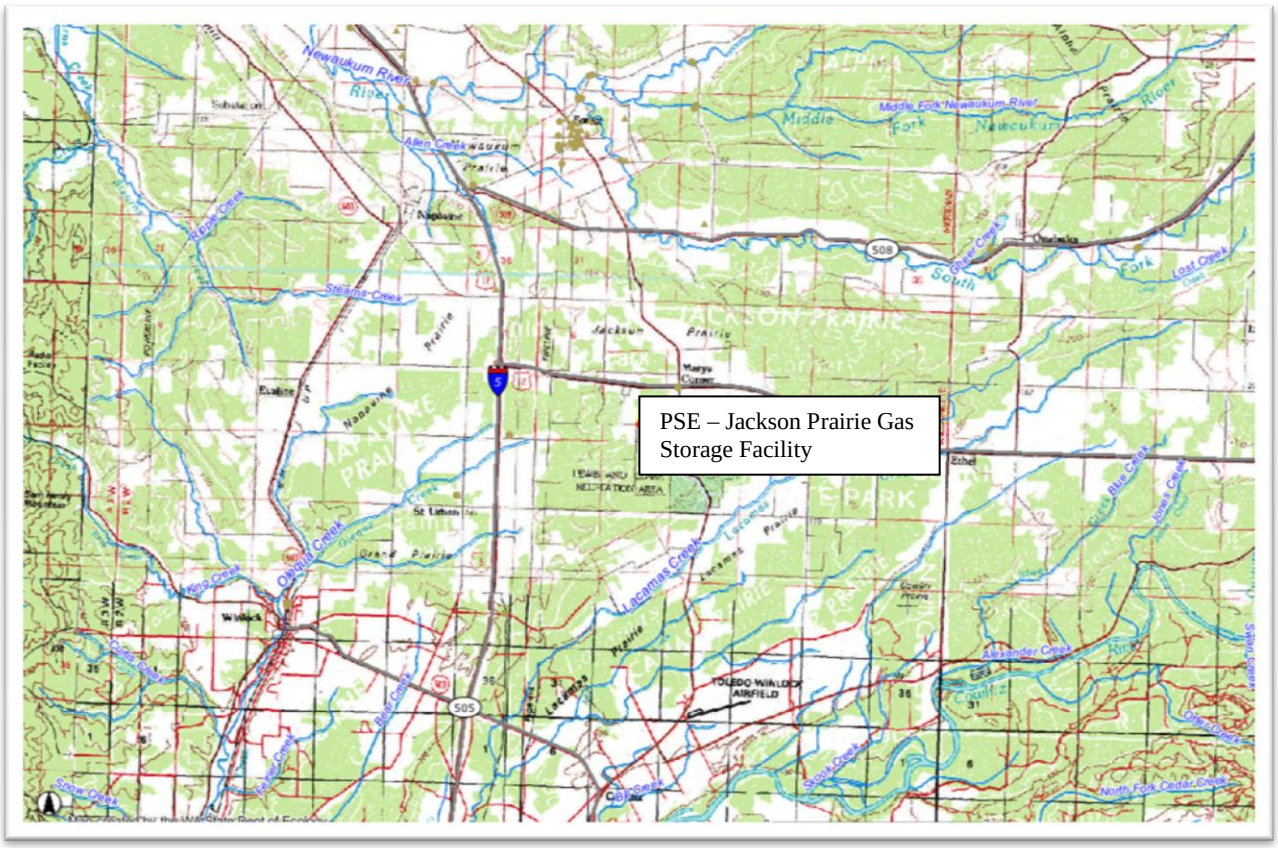


Figure 1. Facility Location Map

A. DESCRIPTION OF THE FACILITY

HISTORY

The Jackson Prairie Gas Storage Project (JPGSP) stores natural gas underground to be used as a seasonal peaking supply or for emergency use if gas supplies to the region are interrupted. The development of the JPGSP began in 1963 and the project was certified in 1970 by the Federal Power Commission. The project was developed through the joint efforts of Washington Natural Gas (now Puget Sound Energy), Washington Water Power (now Avista Corp), and Northwest Pipeline Corporation (now Williams Gas Pipelines West). Customers for gas from the JPGSP include Puget Sound Energy, Avista Corp, Northwest Natural Gas, Intermountain Gas, Terasen Gas Inc., Cascade Natural Gas, Idaho Power Co., The Boeing Co. and others. The facility currently has a storage capacity of approximately 45,000 million cubic feet (Mmcf) and a maximum daily delivery capacity to the pipeline of 1,150 Mmcf. The first NPDES application for discharge of wastewater from this facility was received in 1964. The first NPDES permit for this facility was issued in 1969.

NATURAL GAS STORAGE

Natural gas is stored in three sand/sandstone zones located in bedrock beneath the project area; Zones 1, 2, and 9. Zone 1, the uppermost zone, is about 100 feet thick and approximately 1,100 feet below the ground surface. Zone 2 is about 200 feet thick and approximately 1,800 feet below the ground surface. Zone 9 is about 400-500 feet thick and approximately 2,800 feet below the surface.

The major portion of the gas inventory is currently stored in Zone 2, approximately 37,000 million cubic feet (Mmcf)]. Relatively smaller volumes of gas are stored in Zone 1 (approximately 3,000 Mmcf) and in Zone 9 (approximately 5,000 Mmcf). Because there is some communication between Zones 1 and 2, gas from Zone 1 is recycled periodically back into Zone 2.

A major geological feature of the gas storage project area is a northwest-southeast trending fault, termed the "bounding" fault. All gas storage at the site is on the northeast side of the bounding fault. The bounding fault, coupled with an anticlinal structure on the northeast side of the fault, provides both a structural trap and closure for the subsurface storage of natural gas.

WASTEWATER GENERATION PROCESSES

There are three processes at this facility that generate wastewater:

Gas Storage Wastewater -- To make room for the storage of natural gas, saline water is withdrawn via a series of wells from Zone 2. This is the greatest source of wastewater at the facility and is limited in the current NPDES permit to a maximum daily discharge of 2.2 million gallons. Currently, extracted water is pumped to a 1.5 acre lined collection pond and periodically discharged to the Cowlitz River.

Wastewater Associated With Gas Withdrawal -- As gas is withdrawn from storage at individual wells, various amounts of associated formation water also may be withdrawn. Currently, this water is separated from the gas by gravity at the well site, collected in individual 30 barrel tanks and then trucked to the yard tank in the compressor station. The amount of water produced in this fashion has declined steadily over the last 40 years, as the reservoir has been dried from the many gas injection and withdrawal cycles. Although not metered, the total volume produced from Zone 2 in this fashion is estimated at approximately 42,000 gals annually.

Water Separated From The Gas Entering The Compressor Station – Due to the water saturated nature of the gas produced from some of the storage wells, water may condense from the gas while being transported to the compressor station via the in ground gathering lines. This water is separated from the gas by additional mechanical separation equipment in the compressor station. The water is then piped to the yard tank for disposal. At the yard tank, the water is passed through carbon filters from the first tank to the second. When the second tank is approaching full, the water is sampled and analyzed for contaminants. When cleared for disposal, it is pumped to the pond for discharge to Cowlitz River.

Class II Disposal Well

As a possible backup to the present river discharge Puget Sound Energy had applied to Ecology for permission to dispose of wastewater generated from gas storage Zones 1, 2 and 9 back into Zones 2-9 on the opposite (southwest) side of the bounding fault. As proposed, wastewater removed from the gas storage area could be either pumped directly to an injection well (designated as SU-909) within a closed piping system or could be pumped to the 1.5 acre collection pond and then pumped to well SU-909 for underground injection. The two smaller sources of wastewater, i.e. the associated water collected during gas withdrawal, could also be disposed via underground injection.

As proposed, injection well SU-909 meets the definition of a Class II injection well in Chapter 173-218 WAC i.e., "a well used to inject fluids: brought to the surface in connection with conventional oil or natural gas exploration or production..." if "production" is interpreted broadly. A closer definitional match is found in more recent Federal regulation [40 CFR 144.6 (b)], which is incorporated by reference in Chapter 173-218 WAC. It defines a Class II well as: "Wells which inject fluids: which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production."

PSE and Ecology anticipate that, as a backup to the river discharge, underground injection would provide the most effective means of wastewater disposal for the facility. Underground injection is well established technology in certain other states however, because underground injection is new to this facility and its efficacy is unknown, Puget Sound Energy will maintain permits for both underground and surface water disposal options.

SURFACE DICHARGE OUTFALLS

The surface discharge outfalls consist of drainfields in separate gravel bars beside the Cowlitz River. The gravel bars serve to diffuse the wastewater as it enters the Cowlitz River.

B. Permit Status

PSE, JPGSP submitted an application for permit renewal on January 05, 2009. Ecology accepted it as complete on February 20, 2009. Ecology issued the previous permit for this facility on August 16, 2004**.** The previous permit placed effluent limits on the following parameters:

Cowlitz River

- Flow (GPD): 2, 200,000

Underground Injection Well

- Flow (GPD): Maximum instantaneous, 499,000

- Wellhead pressure, 800 psi

C. Summary of Compliance with Previous Permit Issued

Ecology staff last conducted a non- sampling compliance inspection on December 29, 2009. PSE, JPGSP has complied with the effluent limits and permit conditions throughout the duration of the permit issued on August 16, 2004**.** This permit compliance was determined based on a review of the facility's Discharge Monitoring Reports (DMRs) and the inspections that Ecology conducted on the Permittee's discharge.

D. Wastewater Characterization

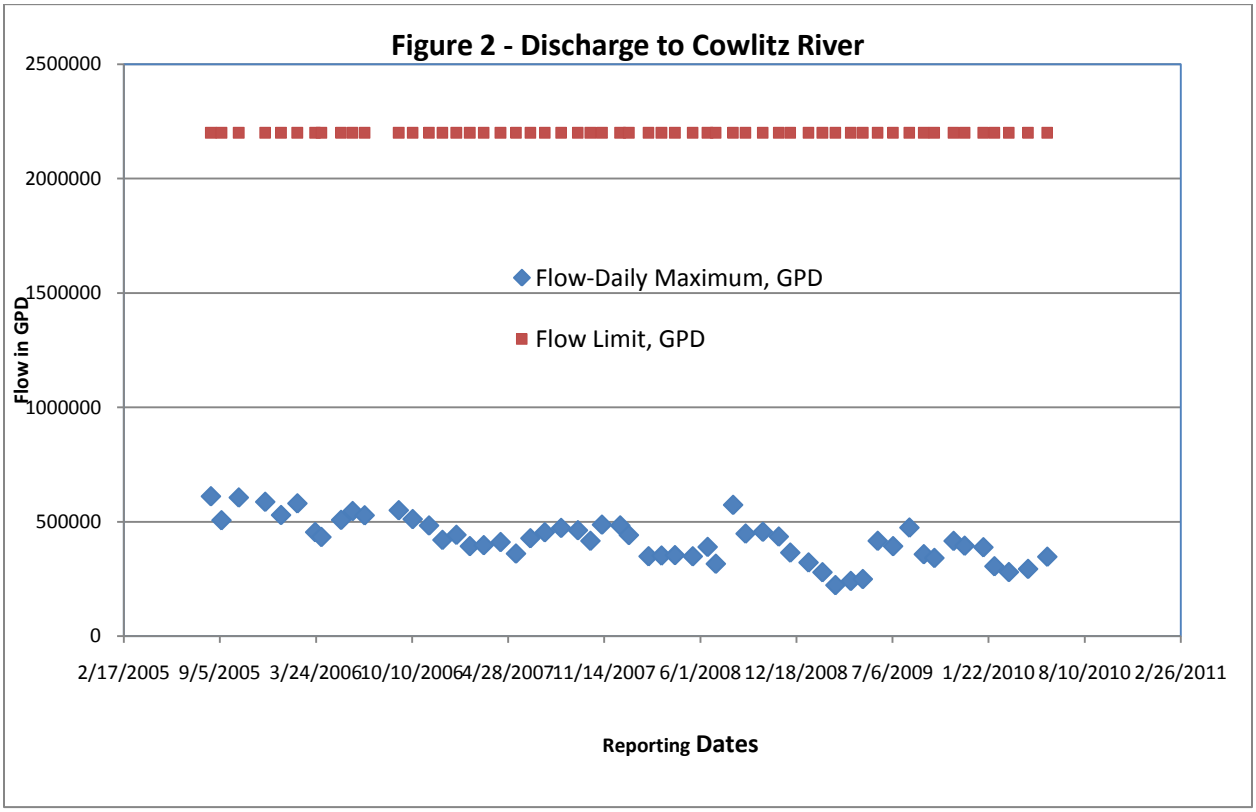
The concentration of pollutants in the wastewater discharge was reported in the NPDES permit application (Table 2) and in discharge monitoring reports for the past five years. The discharge monitoring reports only include the flow limit to the Cowlitz River. Table 2 sampling analysis for this wastewater characterization was collected/conducted before it was discharged to through the gravel bars next to the Cowlitz River.

Table 2 shows the effluent wastewater characteristics submitted with the permit renewal application on January 05, 2009.

Analyte	Unit	Concentration	MRL
BOD	mg/L	ND	4
COD	mg/L	570	250
TOC	mg/L	ND	10
TSS	mg/L	ND	4
NH3	mg/L	8.1	0.04
Flow	gpd	610848	
Temperature, Winter	^{o}C	4.4	
pH	S.U	6.5	
Conductivity	mmhos	54300	1
TDS	mg/L	40000	10
Sodium	mg/L	8130	12.5
Chloride	mg/L	19600	2000
Turbidity	NTU	9.17	
Color	C.U	20	
Total Hardness	mg/L	11200	60
Total Alkalinity	mg/L	15.4	5
Calcium	mg/L	4110	15
Magnesium	mg/L	212	0.5
Potassium	mg/L	69.8	3
Iron (Total)	mg/L	1.72	0.15
Aluminum	mg/L	ND	0.25
Sulfate	mg/L	ND	0.4
Arsenic	mg/L	ND	0.1
Fluoride	mg/L	ND	100

Analyte	Unit	Concentration	MRL
Mercury	mg/L	ND	0.0002
Nitrate - Nitrogen	mg/L	ND	0.01
Cadmium	mg/L	ND	0.005
Copper	mg/L	ND	0.01
Lead	mg/L	ND	0.05
Zinc	mg/L	ND	0.02
Manganese	mg/L	ND	2.54
Silicon	mg/L	8	0.5
Benzene	µg/L	ND	1
Toluene	µg/L	ND	1

Ecology has conducted a database analysis based on Puget Sound Energy JPGSP's DMRs for outfall 001 for the last five years. Figure 2 shows the trend for the flow to Cowlitz River. This figure shows that the Permittee has remained within the permit discharge effluent limit. The Permittee is authorized to discharge their wastewater to an underground injection well. To date, the Permittee has not used this backup plan option but it remains as an allowed alternative discharge in the proposed permit. The well identified for injection has not been converted for that use. It remains an observation well and may be converted to injection at some future date.



E. Description of the Receiving Water

PSE, JPGSP discharges to Cowlitz River. Other nearby point and non point sources of pollutants are not known.

F. State Environmental Policy Act (SEPA) Compliance

Regulation exempts reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions are no less stringent than state rules and regulations. The exemption applies only to existing discharges, not to new discharges.

III. PROPOSED PERMIT CONDITIONS

Federal and State regulations require that effluent limits in an NPDES permit must be either technology or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).

- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36).

- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Nor does Ecology usually develop permit limits for pollutants that were not reported in the permit application but that may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology, as described in 40 CFR 122.42(a), if significant changes occur in any constituent. Industries may be in violation of their permit until Ecology modifies the permit to reflect additional discharge of pollutants.

A. Design Criteria

According to WAC 173-220-150 (1)(g), neither flows nor waste loadings may exceed approved design criteria, however, Ecology does not have an engineering report that specifies the design criteria for the wastewater treatment plant at this facility.

B. Technology-Based Effluent Limits

All waste discharge permits issued by Ecology specify conditions requiring available and reasonable methods of prevention control, and treatment (AKART) of discharges to waters of the state (WAC 173-218-100). There are no federal or state effluent guidelines for this category of discharger. The establishment of best available technology (BAT) is then left to the "best professional judgment" of the individual permit writer.

C. Surface Water Quality-Based Effluent Limits

The Washington State Surface Water Quality Standards (chapter 173-201A WAC) were designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet established surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are published in the Water Quality Standards for Surface Waters (chapter 173-201A WAC). They specify the levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (40 CFR 131.36). These criteria are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The Water Quality Standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three Tiers of protection (described below) for surface waters of the state.

  Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

  This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology may not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.
- For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards.
- Whenever the natural conditions of a water body are of a lower quality than the assigned criteria, the natural conditions constitute the water quality criteria. Where water quality criteria are not met because of natural conditions, human actions are not allowed to further lower the water quality, except where explicitly allowed in this chapter.

  Ecology's analysis described in this fact sheet demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric criteria, so long as the diluting wastewater doesn't interfere with designated uses of the receiving water body (e.g., recreation, water supply, and aquatic life and wildlife habitat, etc.). The pollutant concentrations outside of the mixing zones must meet water quality numeric criteria.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge; and use no more than 25 percent of the available width of the water body for dilution. Ecology uses modeling to estimate the amount of mixing within the mixing zone and determine the potential for violating the water quality standards at the edge of the mixing zone and derive any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's Permit Writer's Manual). Each critical condition parameter (by itself) has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent comprises 10 percent by volume and the receiving water comprises 90 percent of the total volume at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life **acute** criterion is based on the assumption that organisms are not exposed to that concentration for more than one-hour and more often than one exposure in three years. Each aquatic life **chronic** criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two liters/day for drinking water
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit does not authorize the mixing zone for this discharge.

D. Designated Uses and Surface Water Quality Criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (40 CFR 131.36). Criteria applicable to this facility's discharge are summarized below in **Table 5**.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for, the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 3 Aquatic Life Uses & Associated Criteria

Core Summer Salmonid Habitat	
Temperature Criteria – Highest 7DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU
Total Dissolved Gas Criteria	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection
pH Criteria	pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units

- The recreational uses are extraordinary primary contact recreation, primary contact recreation, and secondary contact recreation. The recreational uses for this receiving water are identified below.

Table 6 Recreational Uses & Associated Criteria

Recreational use	**Criteria**
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies /100 mL

- The **water supply use**s are domestic, agricultural, industrial, and stock watering.

- The **miscellaneous fresh water use**s are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Evaluation of Surface Water Quality -Based Effluent Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field

pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

Temperature--The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- **Annual summer maximum and supplementary spawning/rearing criteria**

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1) (c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20 °C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9 °C for char and 13 °C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- **Incremental warming criteria**

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

  At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3 °C above the naturally warm condition.

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3 °C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3 °C warming for each point source is reasonable and protective where the dilution factor is based on 25 percent or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3 °C cumulative allowance (0.075 °C or less) for all human sources combined.

- **Temperature Acute Effects**

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33 °C; unless a dilution analysis indicates ambient temperatures will not exceed 33 °C 2-seconds after discharge.

  General lethality and migration blockage: Measurable (0.3 °C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23 °C or a 7DADMax of 22 °C.

  Lethality to incubating fish: Human actions must not cause a measurable (0.3 °C) warming above 17.5 °C at locations where eggs are incubating.

Annual summer maximum, supplementary spawning criterion and incremental warming criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum, the supplementary spawning criterion, and the incremental warming criteria at the edge of the chronic mixing zone during critical condition(s). Ecology conducted detailed analysis in the permit of 1995 and determined that there was no reasonable potential that the Permittee would exceed surface water quality standards at the mixing zone boundary. The determination of 1995 permit is also effective for the current permit.

pH-- Ecology conducted detailed analysis in the permit of 1995 and determined that there was no reasonable potential that the Permittee would exceed surface water quality standards at the mixing zone boundary. The determination of 1995 permit is also effective for the current permit.

Turbidity— Ecology conducted detailed analysis in the permit of 1995 and determined that there was no reasonable potential that the Permittee would exceed surface water quality standard of this parameter at the mixing zone boundary. The determination of 1995 permit is also effective for the current permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards. The detailed analysis of the 1995 permit showed that there was no reasonable potential that the Permittee will violate the surface water quality standards at the mixing zone boundary. The new permit application shows no significant changes in the Permittee's operation since the last permit, therefore, this determination remain in effect.

F. Human Health

Washington's water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria. Ecology's NPDES permit of 1995 states

that the concept of discharging this extracted water to the Cowlitz River was evaluated by the water pollution control authority, and after an extensive program of pilot studies and measurement of actual in-stream effects, in which the authority was actively involved and the conclusion was reached that:

"The diffusion (of the discharge of high salinity effluent from underground formations) through a natural gravel bar provided adequate dilution of the effluent prior to its entry into the Cowlitz River. The physical, chemical, biological effects of this type of discharge were evaluated and found to be minimal."

The 1995 permit refers to the report titled *"Diffusion Effectiveness of High Salinity Effluent by Cowlitz River Gravel Bar, Washington State Pollution Control Commission, Special Report 66-6, June 1966."* Ecology will reevaluate the discharge for impacts to human health at the next permit reissuance.

G. Sediment Quality

The aquatic sediment standards (WAC 173-204) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the Sediment Management Standards.

H. Ground Water Quality Limits

The Ground Water Quality Standards, (chapter 173-200 WAC), protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

Ecology determined that PSE, JPGSP discharge has a potential to cause a violation of the ground water quality standards. Therefore, the proposed permit includes the following conditions:

Maximum Injection Flow Rate, 499,000 gallons per day -- A limitation on the flow rate is necessary to prevent fractures to the confining zone and the movement of wastewater or formation water into an underground source of drinking water (WAC 173-218-100 and 40 CFR 146.23).

Maximum Permitted Wellhead Injection Pressure, 800 psi -- The maximum permitted wellhead injection pressure was based on the formation fracture gradient, expected flow rates, depth to the top of the injection zone, and other relevant parameters. As determined by Ecology, injection at or below this pressure will prevent fractures to the confining zone and the movement of wastewater or natural formation water into an underground source of drinking water. (WAC 173-218-100 and 40 CFR 146.23)

Prohibitions-Special Condition S1. also contains specific prohibitions related to underground injection. Prohibitions include injection-caused fractures to the underground confining zones, injection-caused migration of injected water or formation water into any underground source of drinking water, and injection between the outermost well casing and the well bore. The legal basis for these prohibitions may be found in WAC 173-218-030 and 173-218-100, and 40 CFR 146.23.

I. Comparison of effluent limits with limits of the previous permit issued on August 16, 2004

The new permit renewal application that Ecology received from the Permittee showed no significant changes in the PSE, JPGSP's effluent wastewater characteristics. Therefore, Ecology has determined

there will be no changes in the permit from the previous permit pertaining to the pollutant limits and monitoring requirements.

Table 8 Comparison of Effluent Limits

Parameter	Previous Effluent Limits: Outfall # 001(Site 1& 2)		Proposed Effluent Limits: Outfall # 001(Site 1& 2)		Previous Effluent Limits: Injection well		Proposed Effluent Limits: Injection well	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Maximum Instantaneous	Maximum Daily	Maximum Instantaneous	Maximum Daily
Flow (GPD)	N/A	2,200,000	N/A	2,200,000	N/A	N/A	N/A	N/A
Flow (GPD)	N/A	N/A	N/A	N/A	N/A	499,000		499,000
Wellhead SU-909 wellhead pressure, psi	N/A	N/A	N/A	N/A	800	N/A	800	N/A

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

A. Lab Accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories* to prepare all monitoring data (with the exception of certain parameters).

V. OTHER PERMIT CONDITIONS

A. Reporting and Recordkeeping

Ecology based permit condition S3. on our authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

B Class II Well Construction and Operation Requirements

Specific construction and operation requirements for injection well SU-909 is included in special condition S4. These include construction requirements, mechanical integrity testing, well failure procedures, and plugging and abandonment procedures. These requirements are given in federal regulation in 40 CFR 146.21 (construction requirements), 146.8 (mechanical integrity), and 146.10 (plugging and abandonment) and state regulation (WAC 173-218-100).

C. Non Routine and Unanticipated Discharges

Occasionally, this facility may generate wastewater which was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes non-routine and unanticipated discharges under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the wastewater.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

D. Spill Plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility under the permit condition S8. to develop best management plans to prevent this accidental release [section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

Puget Sound Energy Jackson Prairie Storage Facility developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

E. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual industrial NPDES permits issued by Ecology.

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for ground waters, after obtaining new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed Permit Issuance

This proposed permit includes all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Washington State Department of Ecology.

2007. Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees. Publication Number 07-10-024

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to (insert the facility name). The permit prescribes operating conditions and wastewater discharge limits. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on June 16, 2010, and June 23, 2010, in the Chronicle to inform the public about the submitted application and to invite comment on the reissuance of this permit.

Ecology will place a Public Notice on August 25, 2010, in the Chronicle to inform the public and to invite comment on the proposed reissuance of this National Pollutant Discharge Elimination System permit as drafted.

The Notice –

- Tells where copies of the draft Permit and Fact Sheet are available for public evaluation (a local public library, the closest Regional or Field Office, posted on our website.).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period
- Tells how to request a public hearing about the proposed NPDES Permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled **Frequently Asked Questions about Effective Public Commenting** which is available on our website at http://www.ecy.wa.gov/biblio/0307023.html.

You may obtain further information from Ecology by telephone, 360-407-6280, or by writing to the permit writer at the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

The primary author of this permit and fact sheet is Aziz Mahar, P.E.

APPENDIX B--GLOSSARY

1-DMax or **1-day maximum temperature**--The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or **7-day average of the daily maximum temperatures**--The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART--The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual Average Design Flow (AADF)--The average of the daily flow volumes anticipated to occur over a calendar year.

Average Monthly Discharge Limit--The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring--Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Detection Limit--See Method Detection Level.

Dilution Factor (DF)--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10 percent by volume and the receiving water 90 percent.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limit--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum Day Design Flow (MDDF)--The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum Month Design Flow (MMDF)--The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum Week Design Flow (MWDF)--The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7.0 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Peak Hour Design Flow (PHDF)--The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak Instantaneous Design Flow (PIDF)--The maximum anticipated instantaneous flow.

Quantitation Level (QL)--The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision &bias) achieves the objectives of the intended purpose. This may also be called Minimum Level or Reporting Level.

Reasonable Potential--A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible Corporate Officer--A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Solid waste--All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the facility. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's homepage at http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html.

APPENDIX D--RESPONSE TO COMMENTS